

WHAT IS CLAIMED IS:

1. A computer readable medium including instructions readable by a computer, which when implemented, cause the computer to detect a significant event in measurement data comprising the steps of:

generating values associated with received measurements, the values indicative of multiples of a standard deviation; and  
calculating the significant event as a function of the values.

2. The computer readable medium of claim 1, wherein the significant event is a point of engagement.

3. The computer readable medium of claim 2, wherein the point of engagement is of an indenter in an indenter test system.

4. The computer readable medium of claim 2, wherein the point of engagement is of a tensile test system.

5. The computer readable medium of claim 1, wherein the received measurements are received as a function of at least one variable, and further comprising processing the received measurements to generate the values.

6. The computer readable medium of claim 5, wherein processing the received measurements to generate the values comprises differentiating the received

measurements with respect to at least one of the variables to generate a derivative signal scattering about zero as a function of one of the variables.

7. The computer readable medium of claim 5, wherein processing the received measurements to generate the values comprises using a compensation function to zero the received measurements.

8. The computer readable medium of claim 6, wherein processing the received measurements to generate the values comprises integrating the derivative signal over a selected increment to generate an integral signal.

9. The computer readable medium of claim 8, wherein processing the received measurements to generate the values comprises calculating the standard deviation from at least part of the integral signal.

10. The computer readable medium of claim 9, and further comprising dividing the integral signal by the standard deviation to generate the values.

11. The computer readable medium of claim 10, wherein calculating the significant event as a function of the values comprises selecting an upper bound based on the generated values.

12. The computer readable medium of claim 11, wherein the upper bound is selected based on an upper threshold correlating to a selected multiple of the standard deviation.

13. The computer readable medium of claim 11, wherein calculating the significant event as a function of the values comprises selecting a lower bound associated with pre-event measurement data.

14. The computer readable medium of claim 13, wherein calculating the significant event as a function of the values comprises using at least one of the upper bound and the lower bound to identify the significant event.

15. The computer readable medium of claim 10, wherein calculating the significant event as a function of the values comprises identifying the significant event as a point correlating to where the integral signal is approximately 2 to 20 times the standard deviation.

16. The computer readable medium of claim 15, wherein calculating the significant event as a function of the values comprises identifying the significant event as a point correlated to where the integral signal is approximately 4 times the standard deviation.

17. The computer readable medium of claim 5, wherein processing the received measurements to generate the values comprises integrating the received measurements to generate an integral signal.

18. The computer readable medium of claim 17, and further comprising calculating the standard deviation from at least a portion of the integral signal.

19. The computer readable medium of claim 18, and further comprising calculating multiples of the standard deviation by dividing the integral signal by the standard deviation.

20. A computer readable medium including instructions readable by a computer, which when implemented, cause the computer to detect a significant event in data measurements comprising the steps of:

receiving a data series indicative of test measurements as a function of a first variable;

generating at least one processed series from the data series;

identifying a first point on the at least one processed series;

identifying a second point on the at least one processed series;

calculating the significant event as a function of at least one of the first point and the second point.

21. The computer readable medium of claim 20, and further comprising receiving the data series as a function of at least one other variable.

22. The computer readable medium of claim 21, wherein the test measurements indicate force.

23. The computer readable medium of claim 22, wherein the first variable comprises displacement and the at least one other variable comprises time.

24. The computer readable medium of claim 21, wherein generating at least one processed series comprises taking a first derivative of the received data series to generate a first processed series.

25. The computer readable medium of claim 24, wherein generating at least one processed series comprises taking a second derivative of the received data series to generate a second processed series.

26. The computer readable medium of claim 25, wherein generating at least one processed series comprises integrating the second processed series over a selected period to generate a third processed series.

27. The computer readable medium of claim 26, and further comprising calculating a standard deviation for at least a portion of the third processed series.

28. The computer readable medium of claim 27, wherein generating at least one processed series comprises dividing the third processed series by the standard deviation to generate a fourth processed series.

29. The computer readable medium of claim 28, wherein identifying a second point on the at least one processed series comprises identifying a point on the fourth processed series threshold where the significant event is assumed to have already occurred.

30. The computer readable medium of claim 29, wherein identifying a second point on the at least one processed series comprises selecting an upper threshold as a function of the standard deviation.

31. The computer readable medium of claim 30, wherein the upper threshold is a multiple of the standard deviation.

32. The computer readable medium of claim 31, wherein the upper threshold is in the range of approximately 10 to 20.

33. The computer readable medium of claim 29, wherein identifying a first point on the at least one processed series comprises identifying a point on the fourth processed series where the significant event is assumed to have not yet occurred.

34. The computer readable medium of claim 33, wherein identifying a first point on the at least one processed series comprises selecting a lower threshold.

35. The computer readable medium of claim 33, wherein the lower threshold is less than 1.

36. The computer readable medium of claim 21, wherein generating at least one processed series comprises integrating the received data series over a selected increment to generate a first processed series.

37. The computer readable medium of claim 36, wherein generating at least one processed series further comprises calculating a standard deviation for at least a portion of the first processed series.

38. The computer readable medium of claim 37, wherein generating at least one processed series further comprises dividing the first processed series by the standard deviation to generate a second processed series.

39. A method of determining a significant event in experimental data comprising the steps of:

generating a data signal indicative of measurements as a function of at least one variable;

processing the data signal to generate a plurality of processed signals; and

determining a significant event based on the processed data signals.

40. The method of claim 39, wherein the step of processing the data signal to generate a plurality of processed signals comprises taking at least a first derivative of the data signal to generate a processed derivative signal as a function of the at least one variable, wherein a portion of the processed derivative signal fluctuates about zero as a function of the at least one variable.

41. The method of claim 40, wherein the step of processing the data signal to generate a plurality of processed signals comprises integrating the processed derivative signal to generate a processed integral signal as a function of the at least one variable, the processed integral function comprising integral values.



42. The method of claim 41, wherein the step of processing the data signal to generate a plurality of processed signals comprises:

calculating a standard deviation over a portion of the integral signal; and

dividing the integral values by the standard deviation to generate a signal comprising multiples of the standard deviation.

43. The method of claim 42, wherein determining a significant event based on the processed data signals comprises determining the significant event based on the signal comprising multiples of the standard deviation.

44. The method of claim 43, wherein determining the significant event based on the signal comprising multiples of the standard deviation comprises:

selecting an upper bound for the significant event;

selecting a lower bound for the significant event;

determining the significant event as a point bounded by the upper bound and the lower bound.

45. The method of claim 42, and further comprising determining an uncertainty of the significant event as a function of the upper bound and the lower bound.

46. The method of claim 42, and further comprising determining an uncertainty of the significant event based on the point bounded by the upper bound and the lower bound.

47. The method of claim 39, wherein the step of processing the data signal to generate a plurality of processed signals comprises integrating the data signal to generate a processed integral signal as a function of the at least one variable.

48. A testing system comprising the computer readable medium of claim 1.

49. A testing system comprising the computer readable medium of claim 17.

50. A testing system recording measurements and capable of determining a significant event comprising:

- a testing apparatus generating a data signal indicative of the measurements recorded as a function of at least one variable; and

- a processor coupled to the test apparatus and a computer readable medium storing processor-executable instructions for identifying the significant event, the instructions comprising steps of:

- receiving the data signal; and

- generating from the received data signal at least one processed

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signal indicative of a multiple of  
a standard deviation.